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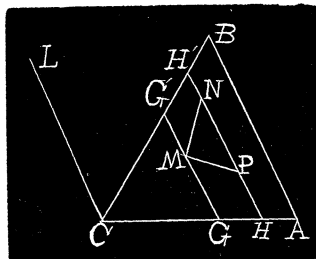
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$$\begin{aligned}
&= \frac{6 \sin A}{b^2 c^2} \int_0^b \int_0^{x'} \int_0^x \left\{ \int_0^u \int_0^{x'} (x-y)(u-v) dv dz \right. \\
&\quad \left. + \int_0^b \int_0^{x'} (x-y)(v-u) dv dz \right\} du dx dy \\
&= \frac{6 \sin A}{b^2 c^2} \int_0^b \int_0^{x'} \int_0^x \left\{ \int_0^u (x-y)(uv-v^2) dv \right. \\
&\quad \left. + \int_0^b (x-y)(v^2-uv) dv \right\} du dx dy \\
&= \frac{\sin A}{b^3 c^2} \int_0^b \int_0^{x'} \int_0^x (2u^3 + 2b^3 - 3b^2 u)(x-y) du dx dy \\
&= \frac{\sin A}{2b^3 c^2} \int_0^b \int_0^{x'} (2u^3 + 2b^3 - 3b^2 u) x^2 du dx \\
&= \frac{c \sin A}{6b^6} \int_0^b (2u^6 + 2b^3 u^3 - 3b^2 u^4) du \\
&= \frac{13bc \sin A}{420} = \frac{13}{210} \frac{1}{2} (bc \sin A) = \frac{13}{210} (\text{area of given triangle})
\end{aligned}$$



9. Proposed by H. C. WHITAKER, B. S., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

Four numbers taken at random are multiplied together. What is the probability that the last digit will be 0?

I. Solution by H. W. DRAUGHON, Clinton, Louisiana.

The probability that the final digit will be odd is $(\frac{1}{10})^4 = \frac{1}{10000}$; the probability that it will be 2, 4, 6, or 8, is $(\frac{4}{10})^4 + 4(\frac{4}{10})(\frac{1}{10})^3 + 6(\frac{4}{10})^2(\frac{1}{10})^2 + 4(\frac{4}{10})^3(\frac{1}{10}) = \frac{15(4)^4}{10000} = \frac{3840}{10000}$. \therefore the probability that it will be 0 is, $P = 1 - \frac{3840}{10000} - \frac{1}{10000} = \frac{5569}{10000} = \frac{11137}{20000}$.

II. Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

We know from *Hall and Knight's Higher Algebra* if n integers be taken at random and multiplied together, the probability that the last digit of the product is 1, 3, 7, or 9, is $P_1 = \frac{4^n}{10^n}$; also, the probability that the last digit of the product is 2, 4, 6, or 8, is $P_2 = \frac{8^n - 4^n}{10^n}$; and, finally, the probability that the last digit of this product is 5, is $P_3 = \frac{5^n - 4^n}{10^n}$. Consequently the probability that the last digit of this product is zero, when $n=4$, is $P_4 = 1 - (P_1 + P_2 + P_3)$; that is, $P_4 = \frac{10^4 - 8^4 - 5^4 + 4^4}{10^4} = \frac{(5^4 - 4^4)(2^4 - 1)}{5^4 \times 2^4} = \frac{1107}{2000}$.

Solutions to this problem were also received from Hon. JOSIAH DRUMMOND, P. H. PHILBRICK and J. F. W. SCHEFFER.

PROBLEMS.

18. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.